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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/506,542	05/05/2005	Marco Romagnoli	05788.0319	1312
22852	7590	11/30/2005		EXAMINER
				ROJAS, OMAR R
			ART UNIT	PAPER NUMBER
				2874

DATE MAILED: 11/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/506,542	ROMAGNOLI ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Omar Rojas	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 05 April 2005.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 10-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 10-17 is/are rejected.
- 7) Claim(s) 18 is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 03 September 2004 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>0904.0505</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|  | 6) <input checked="" type="checkbox"/> Other: <u>Detailed Action</u> .      |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The prior art documents submitted by applicant in the Information Disclosure Statements ("IDS") filed on September 3, 2004 and May 5, 2005 have all been considered and made of record (note the attached copy of form(s) PTO-1449).

### ***Specification***

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. **Claims 10-13, 15, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,134,369 to Kurosawa et al. (“Kurosawa”), submitted by Applicant(s) in an IDS.**

With respect to claim 10, Kurosawa discloses a device for varying the direction of an optical beam (e.g., Figure 2), comprising:

a first waveguide 211 directed along a first direction;

a second waveguide 211 directed along a second direction different from the first direction; and

a bending region at least partially interposed between the first and the second waveguide,  
said bending region comprising:

a photonic crystal (221, 223) having a regular periodicity and having at least a first and a  
second crystal axes substantially aligned with said first and second directions, respectively; and a  
part of said photonic crystal acts as a reflecting surface (col. 3, lines 43-46) so positioned and  
oriented as to reflect an optical beam coming from the first waveguide toward the second  
waveguide. Fig. 2 of Kurosawa is reproduced below.

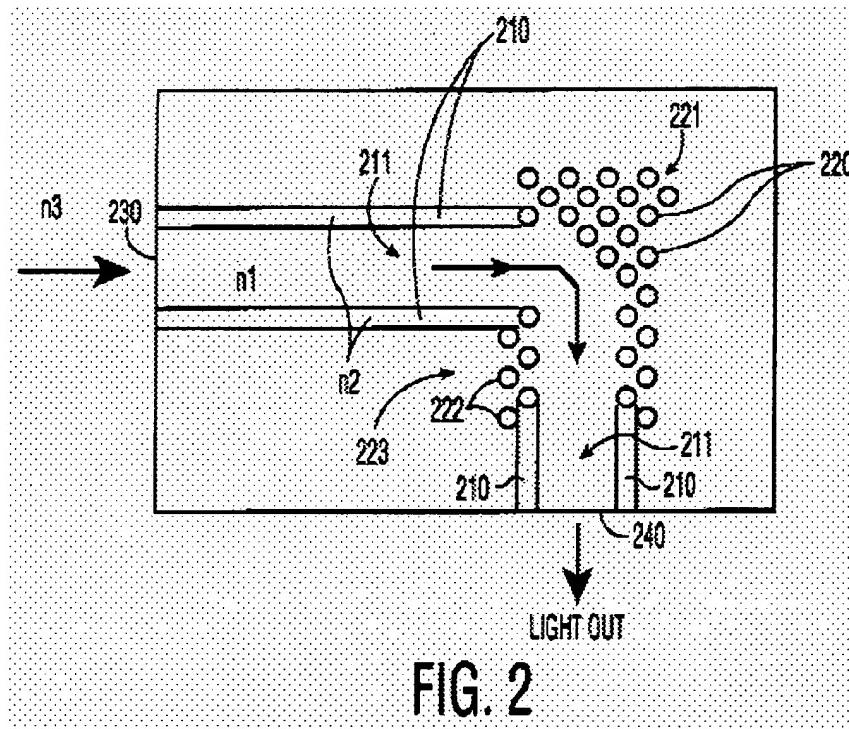


FIG. 2

With respect to claim 11, the photonic crystal (221, 223) comprises a slab of dielectric material and said reflecting surface is realized by forming columns/holes in said slab (col. 3, lines 28-42).

With respect to claim 12, said first and second directions are perpendicular to each other.

With respect to claims 13 and 15, the limitations are disclosed by Kurosawa at col. 3, lines 60-64.

With respect to claim 16, said first and second waveguides 211 are part of an optical integrated circuit.

**5. Claims 10-13 and 16-17 are rejected under 35 U.S.C. 102(b) as being anticipated by “Photonic-crystal spot-size converter” to Kosaka et al. published in Applied Physics Letters, Vol. 76, No. 3 (“the Kosaka article”) and submitted by Applicant(s) in an IDS.**

With respect to claims 10-13, the Examiner has relied upon the International Search Report (“ISR”) for International Application No. PCT/EP02/02465 (“the PCT application”), submitted by Applicant(s) in an IDS. The ISR indicated on page 1 that claims 1-3 of the PCT application lack novelty in view of the Kosaka article. The ISR remarks concerning claims 1-3 are incorporated herein. Claims 10-13 of the instant application have substantially the same scope as claims 1-3 of the PCT application. Therefore, the Kosaka article is considered *prima facie* evidence for showing lack of novelty of claims 10-13 as well.

With respect to claims 16 and 17, as seen in Fig. 4 of the Kosaka article, one of the waveguides is an optical fiber and the other is an optically integrated photonic crystal waveguide.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. **Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kurosawa as applied to claim 10 above, and further in view of the article "The Almost-Magical World of Photonic Crystals" by J.D. Joannopoulos ("Joannopoulos") published in the Brazilian Journal of Physics, Vol. 26, No. 1, March 1996, and submitted by Applicant(s) in an IDS.**

Regarding claims 14, Kurosawa teaches all the limitations of base claim 10 as previously mentioned. Kuroswawa fails to arranging his waveguides 211 at angle of  $\pi/3$  as recited by claim 14. The Joannopoulos article, however, teaches that photonic crystal may be designed to guide

guide light around a 60 degree angle (i.e.,  $\pi/3$ ) using a triangular lattice of air columns.

Joannopoulos, Page 61, column 2. The teachings of Joannopoulos achieve nearly perfect light coupling efficiency as mentioned on page 61. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to obtain the invention specified by claim 14 by rearranging the waveguides of Kurosawa to intersect at an angle of 60 degrees by combining the teachings of Joannopoulos with Kurosawa.

***Allowable Subject Matter***

9. Claim 18 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter: Although the ISR appears to indicate otherwise, in the opinion of this Examiner claim 18 defines patentable subject matter. None of the prior art of record teaches or fairly suggests designing the photonic crystal in the manner set forth by claim 18 such that the group velocity vectors are directed within the second angular range specified by the claim. Absent the Applicant's own teachings (e.g. see pages 8 and 9 of the specification), the invention of claim 18 would not have been obvious to one of ordinary skill in the art at the time of the claimed invention.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Omar Rojas whose telephone number is (571) 272-2357. The examiner can normally be reached on Monday-Friday (12:00PM-8:00PM).

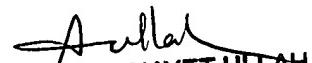
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rod Bovernick, can be reached on (571) 272-2344. The official facsimile number for regular and After Final communications is (571) 273-8300. The examiner's RightFAX number is (571) 273-2357.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Omar Rojas  
Patent Examiner  
Art Unit 2874

or  
November 28, 2005

  
AKM ENAYET ULLAH  
PRIMARY EXAMINER